U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

Scientific Name:

Urocitellus washingtoni

Common Name:

Washington ground squirrel

Lead region:

Region 1 (Pacific Region)

Information current as of:

04/18/2012

Status/Action

___ Funding provided for a proposed rule. Assessment not updated.

___ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

___ New Candidate

_X_ Continuing Candidate

___ Candidate Removal

> ___ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status
>
> ___ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species
>
> ___ Range is no longer a U.S. territory
>
> ___ Insufficient information exists on biological vulnerability and threats to support listing
>
> ___ Taxon mistakenly included in past notice of review
>
> ___ Taxon does not meet the definition of "species"
>
> ___ Taxon believed to be extinct
>
> ___ Conservation efforts have removed or reduced threats

___ More abundant than believed, diminished threats, or threats eliminated.

Petition Information

___ Non-Petitioned

_X_ Petitioned - Date petition received: 03/02/2000

90-Day Positive:05/04/2004

12 Month Positive:10/26/2011

Did the Petition request a reclassification? **No**

For Petitioned Candidate species:

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing? **Yes**

Explanation of why precluded:

Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for this species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The Progress on Revising the Lists section of the current CNOR (http://endangered.fws.gov/) provides information on listing actions taken during the last 12 months.

Historical States/Territories/Countries of Occurrence:

- **States/US Territories**: Oregon, Washington
- **US Counties**: Gilliam, OR, Morrow, OR, Umatilla, OR, Adams, WA, Columbia, WA, Douglas, WA, Franklin, WA, Garfield, WA, Grant, WA, Lincoln, WA, Walla Walla, WA
- **Countries**: United States

Current States/Counties/Territories/Countries of Occurrence:

- **States/US Territories**: Oregon, Washington
- **US Counties**: Gilliam, OR, Morrow, OR, Umatilla, OR, Adams, WA, Douglas, WA, Franklin, WA, Grant, WA, Lincoln, WA, Walla Walla, WA
- **Countries**:Country information not available

Land Ownership:

Approximately 85 percent of lands within the Washington ground squirrel's range are privately owned (Washington Department of Fish and Wildlife [WDFW] 2005, Oregon Department of Fish and Wildlife [ODFW] 2006). While much of the land within the squirrel's range has been converted to agriculture or residential uses, there are unquantified, scattered areas of both privately-owned and government-managed shrub-steppe and grassland habitat within the squirrel's range. The greatest concentration of Oregon sites is

located on the United States Navy's (Navy) Boardman Naval Weapons Systems Training Facility (BNWSTF) and the adjacent Nature Conservancy-managed Boardman Conservation Area (BCA). There are additional sites, mostly west of these properties, on private and Bureau of Land Management (BLM) land. In Washington most of the known sites occur in Grant, Adams, and Douglas counties, but there are also isolated, scattered sites in Lincoln, Franklin, and Walla Walla counties.

Betts (1990, 1999) and the WDFW (Finger et al. 2007, Germaine et al. 2007) resurveyed most historic sites in Washington, documenting the extirpation of many of these sites. Betts (1990, 1999) also resurveyed historic sites in Oregon, documenting the extirpation of many historic Oregon sites, as well as documenting range contraction in both Oregon and Washington. Since Betts' surveys, additional squirrel locations have been discovered, suggesting the periphery of their range, particularly in Washington, has not contracted as much as Betts (1990, 1999) previously found. However, Betts (1990, 1999) still provides evidence of range contraction. There has also been a significant amount of habitat conversion within the boundary of their current range, which is apparent from current land cover classifications and satellite imagery. Most of the more recently discovered (i.e., post Betts' work) sites in Oregon have been located on scattered fragments of suitable habitat and found while surveying areas to develop wind farms or to install or upgrade transmission lines. A larger number of sites have been recently documented in Washington. To the extent available, information on every site's classification (i.e., single individual or colony), size, connectivity, significance, and likelihood of persistence into the foreseeable future needs to be collected and fully evaluated in the upcoming status review of the Washington ground squirrel for the Multi-District Litigation (MDL) settlement.

Together, the BCA and BNWSTF support 75 to 80 percent of currently known Oregon sites and approximately one-third of known sites within the species' range. While not all of the BNWSTF and BCA are occupied, site distribution fluctuates, covering large portions of the properties at various densities. This area constitutes the largest continuous area of occupied habitat in Oregon, and is likely the largest area of contiguous occupied habitat in the entire range of the Washington ground squirrel, as it covers approximately 26,775 hectares (ha), or 66,162 acres.

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Biological Information

Species Description:

The Washington ground squirrel is distinguished from other Washington and Oregon ground squirrels by its relatively smaller size, light eye ring, small ear pinnae, shorter tail, and white speckled dorsum (Carlson et al. 1980, Yensen and Sherman 2003). It ranges from 185 to 245 millimeters (7.3 to 9.6 inches) in total length and its weight fluctuates throughout the season as a function of body fat content (Rickart and Yensen 1991).

The Washington ground squirrel is diurnal, semi-fossorial, and spends much of the year underground. Adults emerge from hibernation between January and early March, depending on elevation and microhabitat conditions (Rickart and Yensen 1991, Sherman 2000). Adults return to their burrows by late May to early June, and juveniles return about a month later (Carlson et al. 1980, Verts and Carraway 1998). Estivation is thought to transition directly into hibernation (ODFW 1999, Sherman and Shellman Sherman 2005).

Washington ground squirrels usually live less than five years and have high annual mortality rates. Mortality rates at four Washington study sites between 2005 and 2006 were 66 percent for males and 76 percent for females. Possible causes of mortality included starvation or freezing during estivation/hibernation, predation, disease, and human interference (Sherman and Shellman Sherman 2006).

Washington ground squirrels produce one litter annually. Females are sexually receptive on only one afternoon per season, usually within a few days of emergence from hibernation (Sherman 2000, Sherman and Shellman Sherman 2005). Uterine litter sizes range between 5 and 11 with an average of 8 (Scheffer 1941). Carlson et al. (1980) reported an average litter size of 5. Pups emerge above ground between March and April.

Little is known about Washington ground squirrel behavior, but Sherman (2000) indicated that females are exceptionally social, often forming coalitions or groups with up to three other females within their semi-isolated communities. Males are more mobile and/or dispersive than females (Greene 1999; Sherman and Shellman Sherman 2005, 2006; Delavan 2008). In Oregon, juvenile male dispersal distances ranged from 40 to 3521 m (131 to 11,551 ft), with a median of 880 m (2,887 ft) (Klein 2005). Primitive roads were not dispersal barriers but land in agricultural production has likely altered dispersal patterns (Carlson et al. 1980, Klein 2005).

Taxonomy:

The Washington ground squirrel is a member of the family Sciuridae (squirrels, chipmunks, and marmots), subfamily Sciurinae, and tribe Marmotini. It was formerly part of the genus Spermophilus. However, this genus was recently revised, and now there are eight new ground squirrel genera that were formerly included in the genus Spermophilus (Helgen et al. 2009). The Washington ground squirrel is now one of 12 species in the genus Urocitellus (Holarctic ground squirrels, Helgen et al. 2009). We have carefully reviewed the available taxonomic information and on that basis we conclude that this is a valid taxon.

Habitat/Life History:

Habitat

The Washington ground squirrel occurs in shrub-steppe and grassland habitat in the Columbia Basin ecosystem (Verts and Carraway 1998, Dobkin and Sauder 2004). Historically, the Washington ground squirrel is primarily associated with sagebrush (Artemisia sp.) and bluebunch-wheatgrass (Agropyron spicatum.) habitats (Verts and Carraway 1998), although cheatgrass (Bromus tectorum) and rabbitbrush (Chrysothamnus sp.) have replaced much of the original flora on nonagricultural land. They are currently found in all these habitats where there is sufficient forage and suitable soils.

The Washington ground squirrel occupies sites with sandy or silt-loam texture soils that are deep and supportive enough to accommodate its burrow structures (Betts 1990, Yensen and Sherman 2003). Although this species is associated with sagebrush-grasslands of the Columbia Plateau (Betts 1990, Verts and Carraway 1998), studies indicate that silt-loam (Rickart and Yensen 1991, Greene 1999) and/or sandy soils are also an important habitat component (Burts 1990, Yensen and Sherman 2003). The Washington ground squirrel seldom constructs burrows in areas of heavily disturbed soils, such as areas affected by plowing, discing, and crop production (Betts 1990, 1999; Greene 1999).

Sagebrush habitat may maintain ground squirrel populations because it supports a more stable food source, especially during drought periods (Van Horne et al. 1998b, Greene 1999). Betts (1990) and Greene (1990) determined that the Washington ground squirrel occupied areas with a greater annual and total grass and forb cover. Transect surveys and mark-recapture data indicated that the highest squirrel densities occurred in sagebrush, followed by grassland habitat. Recruitment was highest in sagebrush, followed by bunchgrass, then low-shrub habitat.

Diet

Washington ground squirrels eat a broad range of succulent forb and grass stems, buds, leaves, flowers, roots, bulbs, and seeds (Greene 1999). Diverse diets help squirrels acquire sufficient fat and protein for reproduction and survival through estivation and hibernation (Tarifa and Yensen 2004a, Sherman and Shellman Sherman 2005). Native plants appear important to Washington ground squirrels, with Sandberg bluegrass (Poa secunda) playing a key role in their diets (Tarifa and Yensen 2004a,b).

Ecological Significance

The Washington ground squirrel is an important component of the Columbia Basin ecosystem. It serves as a prey base for predator food chains, and its burrowing activity reduces soil compaction, loosens and aerates soils, and increases the rate of water infiltration into soil. Additionally, this species increases soil fertility, plant diversity and productivity, and microhabitat diversity by bringing nutrients and buried seeds from deep soil layers to the surface (Vander Haegen et al. 2001, Yensen and Sherman 2003). Also, their burrows, and the holes dug by badgers pursuing them in their burrows, are reused by many species including snakes, lizards, insects, and western burrowing owls (Athene cunicularia hypugaea) (Greene 1999).

Historical Range/Distribution:

The Washington ground squirrel is endemic to the Columbia Plateau, south and east of the Columbia River and east of the John Day River (Bailey 1936, Howell 1938, Betts 1990, Verts and Carraway 1998).

Current Range Distribution:

Based on information provided in Betts (1990, 1999), we previously described the Washington ground squirrel's range as three clusters of sites, with two in Washington (the Columbia Basin and Badger Mountain) and one in Oregon. We no longer describe its current range as three clusters of sites because additional sites, which may consist of individual detections and/or colonies (see individual verses colony detections below), were more recently located between the Columbia Basin and Badger Mountain clusters. Additionally there are at least two sites near the Oregon and Washington border, well outside the three previously described clusters.

Although many new sites have been documented with increased survey effort, there have also been many site vacancies range-wide (Betts 1999, Marr 2003; 2006, Finger et al. 2007) and habitat conversion has and continues to reduce the amount of available suitable habitat. In most cases, the reason for site extirpations is unknown. It is also unknown whether all of the squirrels die, or if some dispersed to new areas or other established sites. If the latter, the balance of new sites and extirpated sites may reflect local source-sink dynamics, but whether this is occurring within normal limits is also unknown.

In Washington, this species occupies sagebrush-steppe and grassland habitat east of the Columbia River in Adams, Douglas, Franklin, Grant, Lincoln, and Walla Walla counties. Most sites occur in Adams, Grant, and Douglas counties near the following areas: Hatton, Lind, Ritzville, Duffy Creek, Foster Coulee, Jameson Lake, Sagebrush Flats, Beezley Hills, Black Rock Coulee, Smyrna Bench, Soap Lake, Warden, Saddle Mountains, Seep Lakes, and Moses Coulee. Areas predominated by small sites include Foster Coulee, Duffy Creek, Saddle Mountains, Beezley Hills, and Sagebrush Flats, whereas the largest sites occur in the Warden, Moses Coulee, Lind, Soap Lake, and Seep Lakes areas (Finger el al. 2007). As of 2012, the Washington Natural Heritage Program contained 567 verified Washington ground squirrel polygons (i.e., mapped estimate of areas containing squirrels) and 65 verified point locations in its database, any one of which could constitute an individual, small, or large colony. This database does not include all the detections that were made during a 2009-2010 survey in the Odessa area.

In Oregon, Washington ground squirrels occur in Gilliam, Morrow, and Umatilla counties. The Oregon population is centered largely on the BNWSTF and the adjacent BCA. Washington ground squirrels are also found on private and BLM land west of these properties, on Lindsay Prairie, and on some additional scattered private lands. As of 2012, the ODFW had 705 Washington ground squirrel sites in its database, any one of which could represent an individual, small, or large colony. Fifty-two of these sites were documented between 1938 and 1999, making their current status uncertain. At least 527 of the remaining 653 (80.7%) sites occur on the BCA, BNWSTF, and The Nature Conservancy-managed Lindsay prairie. Eighty sites were discovered during pre-construction and siting surveys for transmission and wind projects and 39 were located on BLM land. The remaining 7 sites are locations where genetic samples were taken for a study, at sites that were previously known.

Sites from the Oregon and Washington databases are not directly comparable. A number of factors collectively create a degree of variability and uncertainty in the use of naming conventions to describe areas used by Washington ground squirrels. First, the biology of the squirrel, including short periods where they occur above ground, a tendency for male dispersal, and, in some cases, the large area into which they could disperse, causes uncertainty whether a squirrel detection is a lone disperser or one individual in a colony. This uncertainty is compounded by a lack of exhaustive, long-term survey data regarding squirrels and colonies, both within and among years, throughout a large portion of their range. For example, locations supporting a colony one year may not support it the next year, but this area may be re-colonized in future years. When sites are vacated, it is uncertain whether individuals from vacated colonies dispersed or died. Little is known about the source-sink dynamics among patches, and we do not have information that indicates a minimal viable population size for an isolated patch or colony.

On top of this uncertainty, researchers do not apply consistent terminology when reporting survey results. For example, there is not a clear definition of what constitutes a single colony for this species. Distance between squirrels, and connectivity between squirrels are important factors to define a colony, but researchers may apply different standards to describe a colony. In Oregon (but not Washington), researchers have also used the term "patch" to describe what could be called a colony. However, several patches could be a colony or a metapopulation, depending on the connectivity and movement of squirrels among patches. The terms "detection," "occurrence," or "site" could all be an individual, a disperser, or an actual colony. We hope to eventually bring a standardized convention to describing squirrel populations, but at this time we are hampered by the lack of exhaustive information.

Population Estimates/Status:

A good estimate of overall population size and population trends are not available due to an overall poor understanding of the species' population dynamics (ODFW 1999). Populations appear to fluctuate widely at a local scale. Long-term monitoring of occupied sites will be necessary to better understand population dynamics at a local scale.

Distinct Population Segment(DPS):

An analysis of potential distinct population segments within the population of the Washington ground squirrel has not been completed.

Threats

A. The present or threatened destruction, modification, or curtailment of its habitat or range:

This species is threatened by the effects of historic, ongoing, and imminent habitat loss and modification.

Numerous sources cite a 51 to 85 percent loss and/or degradation of historic Washington ground squirrel habitat throughout the Columbia Basin (Betts 1990, 1999; Hafner et al. 1998, ODFW 1999, Kagan et al. 2000, Wisdom et al. 2000, Knick et al. 2003, Dobkin and Sauder 2004, Quinn 2004, Tarifa and Yensen 2004a). In the Umatilla Basin of Oregon, there has been an 86 percent decrease of historic sagebrush and 44 percent decrease of bluebunch-wheatgrass habitat. In Washington, only 40 to 50 percent of historic shrub-steppe habitat remains, and public lands comprise a small portion of Washington's remaining shrub-steppe habitat (Dobler 1996, Vander Haegen et al. 2001).

Most habitat destruction and range curtailment are attributed to agricultural development (e.g., crop circle, dryland wheat, and intensive livestock grazing) that may completely remove or alter suitable habitat (Carlson et al. 1980, Betts 1990, 1999; Quade 1994, Dobler 1996, Vander Haegen et al. 2001). Soil disturbance associated with crop production may be the most damaging agricultural activity to squirrels (Carlson et al. 1980, Quade et al. 1984, Greene 1999). Tilling and other soil disturbance destroy the structure of silt soil-types (e.g., Warden soils) that are important components of the species' habitat (Greene 1999). Historically, agricultural development occurred primarily in areas with arable, deep soil. Consequently, there has been a disproportionate loss of these soil communities, leaving a greater proportion of shallow soil shrub-steppe habitats (Vander Haegen et al. 2001). Since ground squirrels depend on deep soil (Betts 1990, 1999; Greene 1999), this has reduced much of their habitat. Overall, approximately 66 percent of the Washington ground squirrel's total former range has been converted to agriculture (Tarifa and Yensen 2004a). Washington's Comprehensive Wildlife Conservation Strategy (CWCS) considers agriculture an ongoing threat in this state (WDFW 2005).

In addition to changes in soil composition, agricultural practices may inadvertently impact adjacent Washington ground squirrel colonies. Greene (1999) found that Washington ground squirrel density and abundance decreased with higher percentages of bare ground. Certain practices, such as leaving croplands fallow, could negatively affect foraging Washington ground squirrels. Bare ground may also leave squirrels more vulnerable to predation (Greene 1999). Carlson et al. (1980) described wheat fields as dispersal barriers (due to little or no vegetation coverage during years where fields are fallow) for the Washington ground squirrel. Morgan and Nugent (1999) reported evidence of freshly dug squirrel holes extending about 40 m into an old wheat field from a grassland-associated colony along the field's edge but as of 2007, colonies still have not been established in the wheat field (Marr 2003, 2004). There have been some reports of squirrels using lands enrolled in the Conservation Reserve Program (CRP) in Washington by WDFW. The extent that squirrels may use CRP land is unknown, and would depend partly on the historic land-use of the property.

Some types of agriculture have a higher negative impact on squirrel habitat than others. While low to moderate grazing may be compatible with this species, intensive grazing reduces cover and forage, negatively affecting Washington ground squirrels (Greene 1999). Reduced cover may make squirrels more vulnerable to predation (Vander Haegen et al. 2001). Intensive grazing also facilitates the spread of invasive weeds (Knick et al. 2003), such as cheatgrass. Cheatgrass can out-compete the native bunchgrasses and forbs that comprise Washington ground squirrel diets. Cheatgrass productivity varies with annual precipitation, making it an unstable food source (Vander Haegen et al. 2001). Carlson et al. (1980) found that Washington ground squirrels start estivating two to four weeks earlier in grazed areas, potentially indicating that green forage was in short supply. Early estivation can be harmful to squirrels if they have not reached an adequate weight to maintain body functions until emergence the following spring (Carlson et al. 1980).

Other agricultural practices may also negatively affect the continued existence of Washington ground squirrels. The species has been classified as an agricultural pest since it was first identified (Bailey 1936, Howell 1938). As late as 1999, the Oregon Department of Agriculture received applications to apply pesticides to reduce Washington ground squirrel predation on crops. Other rodent species occur within and adjacent to the range of the Washington ground squirrel that are also considered agricultural and residential pests and are targeted with pesticides that could incidentally impact Washington ground squirrels. At least 27 pesticides are registered in Oregon and Washington for application to control ground squirrels (Washington State University (WSU) 2000). Their uses vary from home and garden to general rangeland applications

(WSU 2000). Applications may also be targeted at other species that occur near Washington ground squirrel colonies (WSU 2000), but Washington ground squirrels could inadvertently be affected by runoff, overspray, or accidental ingestion. The authorized use of these pesticides is widespread in Oregon and Washington (WSU 2000) and is particularly likely to impact small, isolated colonies, but the overall effect of these chemicals on the species is unknown.

Other sources of habitat destruction and modification include the following: residential and power (e.g., wind, oil, and gas) development, past and potential future military activities (i.e., range development), recurrent fire, and conversion of native vegetation to non-native species (which is accelerated by fire, ground disturbance, and intensive grazing). These threats immediately, or over time, remove potential or currently used burrowing and foraging habitat, and some directly kill individuals through placement of permanent structures (e.g., buildings, power facilities) over existing colonies. Depending on the action, its proximity to active colonies, and connectivity to other viable colonies, these actions may result in permanent, long-term, or short-term (less than 10 years) habitat loss.

The historic loss of colonies and habitat, including recent declines in parts of the range, is well documented. Betts (1990, 1999) documented the curtailment of the squirrel's range and found that the species had disappeared from 74 percent of historic sites surveyed in Washington and 77 percent of historic sites surveyed in Oregon. Betts' surveys illustrate a historic decline in squirrel distribution, particularly on Oregon private land. More specifically, Betts (1990) documented 67 percent of 1989 Oregon sites were privately owned compared to 11 percent in 1998 (Betts 1999). Additional squirrel locations found after Betts' (1990, 1999) work; suggest the periphery of their range, particularly in Washington, has not contracted as much as previously thought. However, Betts (1990, 1999) still provides evidence of range contraction from their historic distribution. Furthermore, there is still evidence of habitat loss and fragmentation within the current range of the species. Some of the greatest range reduction and documented habitat destruction have occurred in Oregon (Betts 1990, 1999). By 1999, the 36 colonies Betts had observed had been reduced to 9, a decrease of 75 percent (Betts 1999). Later, Greene (1999) completed a more detailed survey of the BNWSTF, documenting 69 colonies where Betts had found far fewer (although there were differences in areas surveyed and survey effort). Marr (2003) revisited Greene's sites and found additional sites, documenting 149 total sites (not necessarily all of which constitute colonies) in 2003 (Marr 2003). While additional sites have been reported, a number of known sites have been vacated. For example, only 61 percent of sites occupied in 1997, and from 2000 to 2002, were still occupied in 2003 (Marr 2003). More recently, Marr's 2006, data showed a 10 percent extirpation rate of sites (or patches) on the BCA and BNWSTF from 2005, balanced in part by new patches which may or may not be actual colonies. More specifically, 34 patches were vacated and only 16 new patches were located, showing a net loss of 18 patches between 2005 and 2006.

Although new squirrel patches that have been located with additional survey effort could initially appear as an increase in population size and/or range, many new locations are within currently defined populations and do not constitute a range expansion. Information on every site's classification (i.e., single individual or colony), size, connectivity, significance, and likelihood of persistence into the foreseeable future needs to be collected andfully evaluated in the upcoming status review of the Washington ground squirrel for the MDL settlement. Furthermore, patch sizes, relationship of patches and/or colonies to each other, habitat availability and changes in the amount of available habitat, the historic and recent disappearance of patches or colonies, and the long-term viability of an individual patch will need to be considered in assessing the population status of the Washington ground squirrel.

There is a formal conservation agreement to protect this species in a large portion of its range in Oregon. The Threemile Canyon Farms Multi-Species Candidate Conservation Agreement with Assurances (MSCCAA) between Threemile Canyon Farms, The Nature Conservancy, PGE, ODFW, and the Service was signed in 2004. The MSCCAA includes commitments from the permittees to implement a number of conservation measures intended to benefit the Washington ground squirrel and three bird species. One of the most

significant conservation measures was the placement and management of 9,146 ha (22,600 acres) into a permanent conservation easement, and another 356 ha (880 acres) of property was designated by PGE as a Conservation Area.

In Washington, there are currently no formal agreements with private landowners, or State or Federal agencies to protect the Washington ground squirrel, nor do we know of any State or Federal agencies that have management plans that specifically address the needs of the species.

While the proposed development of Threemile Canyon Farms for agriculture has been considered a threat to the Oregon population, the potential impact of this development has been greatly reduced since all but three known sites are protected on the BCA (David Evans and Associates 2004). The Boeing Radar Range, north of the BCA, may contain suitable habitat and active colonies, and will be surveyed for Washington ground squirrels by qualified biologists prior to any ground-disturbing activities (David Evans and Associates 2004).

The BNWSTF, which supports the highest known concentration of Washington ground squirrels and the best available habitat (Carlson et al. 1980, Betts 1990, Quade 1994, Greene 1999), is not fully protected. Roughly 11 percent of the 17,273 ha (42,682 acres) comprising the BNWSTF is designated as Research Natural Areas and managed by The Nature Conservancy. The remaining 89 percent is managed by the Navy for military training, and has previously been managed for grazing allotments (Quade 1994, Greene 1999). The Navy has not allowed grazing on the site for at least seven years, but this does not preclude grazing in the future.

The Navy planned to decommission the BNWSTF in 2000, eliminating all military training and military security personnel from the site. However, as of 2010, the Navy was still using the site for military training and in 2007, placed additional fire personnel on the BNWSTF, indicating that the Navy will continue to manage the site in the foreseeable future. The range has reduced activity in recent years, and its use has changed since the development of a 1999 Integrated Natural Resources Management Plan (INRMP). In 2006, the Navy started working with the Service, ODFW, and The Nature Conservancy to revise their INRMP, and this revision is in the signatory process.

The Oregon Military Department (OMD) started going through the National Environmental Policy Act (NEPA) process to install two permanent weapons training ranges and two portable Convoy Live Fire Ranges (CLFRs) on roughly 13 percent of the BNWSTF. The Service commented on a draft Environmental Assessment (EA), recommended measures to minimize negative effects to Washington ground squirrels and suggested a more thorough effects analysis to address the potential impact of increased noise to wildlife and the environmental impacts to the BCA. Based on the draft EA, we are concerned with the direct loss of squirrels from construction and increased road kills, possible incidental harm and/or harassment from operations, as well as an increased wildfire and invasive species threat which may also impact the adjacent BCA. Due to the complexity of the action, the OMD and Navy will complete an Environmental Impact Statement (EIS) for this project instead of an Environmental Assessment. They are currently in the scoping process and will likely have a draft EIS completed in 2012. Since we have not seen a final proposed action, or even a preferred alternative, we are uncertain of the immediacy, scope, and severity of this threat. However, these actions, if implemented, will almost certainly result in the direct loss of squirrels and suitable habitat in one of most highly populated and contiguous portions of this species' range.

The number of wind power projects is increasing in Washington ground squirrel habitat, and the extent of this threat is not fully understood. Habitat loss and degradation caused by wind power projects appears to be more of a threat in Oregon than Washington because there are a larger number of projects being sited in Washington ground squirrel habitat in Oregon. Projects can negatively impact squirrels by permanently removing habitat in known sites or suitable habitat adjacent to occupied sites, further fragmenting the species' distribution. While some projects are placed on retired cropland, many sites have been permitted in native shrub-steppe habitat. Recent surveys of proposed sites on Oregon private land have frequently located Washington ground squirrels, but these sites are generally small and isolated and do not exist at densities that occur on the BCA and BNWSTF (Cherry 2007, pers. com.). Wind farm and transmission

development-related surveys have located additional Washington ground squirrel colonies in Oregon. However, our understanding of the potential effects of wind farms on adjacent colonies is limited. Also, while some wind farms have avoided directly placing structures on current colonies, structures have been placed in nearby potential habitat, limiting areas that could be used for future dispersal or colonies.

In Oregon, wind power projects that have a capacity to generate 105 or more megawatts (MW) undergo a siting process that is coordinated through the Oregon Department of Energy (ODOE). Since the Washington ground squirrel is listed as endangered in Oregon, developers are required to survey for squirrels in potential habitat and to avoid known colonies. Projects that have a generation capacity smaller than 105 MW follow local zoning and permitting requirements, and need a conditional use permit from the county in which the project occurs. In 2008, the Service, ODFW, and ODOE finalized wind energy siting and permitting guidelines that could be used for all permitting jurisdictional levels in the Oregon Columbia Plateau Ecoregion. The guidelines were developed with stakeholder input and, if implemented, will provide protection for the Washington ground squirrel. Under these guidelines, currently occupied sites are considered irreplaceable, essential habitat, and are consequently to be avoided. Additionally, if a proposed wind farm is likely to impact unoccupied, potential habitat adjacent to colonies, under the guidelines, developers are expected to address habitat loss with in-kind and in-proximity mitigation. The State of Washington also has draft wind power guidelines that encourage the protection of Priority Habitats and Species, but WDFW does not have regulatory authority specific to wind power development and squirrel conservation at this time.

Residential and urban development is also a threat to habitat of the Washington ground squirrel. Betts (1999) documented loss of one squirrel-occupied site on Badger Mountain from house construction. More recently, a Washington ground squirrel population was partly destroyed in Washington in 2005 from construction of new apartment buildings, and the same population was affected through construction of recreational fields in 2006. Part of this population was translocated to the CNWR. Urban expansion is a currently a threat at several squirrel-occupied sites in Washington (Wiles 2007, pers. com.).

Another habitat-related threat to the Washington ground squirrel is the conversion of shrub-steppe habitat to non-native species such as annual grasses and noxious weeds. Much of the native shrub-steppe habitat that has not been converted to agriculture has been invaded by non-native annual grasses (e.g., cheatgrass) or has been converted completely to non-native annual grassland (Knick et al. 2003). Cheatgrass is common in within the range of the Washington ground squirrel, particularly in Oregon. Cheatgrass can occur in large, dense, continuous patches in both inter-shrub and below-shrub spaces where there has been ground disturbance such as fire. Cheatgrass and other noxious weeds threaten squirrels by competing with native plants that are important for ground squirrel diets.

Altered fire regimes also threaten this species. Cheatgrass carries fire well and increases the natural fire hazard, changing fire recurrence intervals from 20 to100 years for sagebrush grassland ecosystems to 3 to 5 years for cheatgrass-dominant sites. The typical rates of fire spread, intensity, size, and frequency have also increased. Increased occurrence of fire earlier in the growing season negatively affects native herbaceous species and frequent fire eliminates native shrubs, forbs, and perennial grasses (Ypsilantis 2003), thus allowing non-native species to further out-compete native species (Yensen et al. 1992, Marr 2001, Vander Haegen et al. 2001). Cheatgrass recovers quickly after wildfires and can out-compete native grasses (Vander Haegen et al. 2001). Since big sagebrush seeds are short-lived, if fire returns before new seedlings are reproductive (4 to 6 years), sagebrush can be eliminated from the community.

In July of 1998, lightning ignited a wildlife that consumed approximately 9,700 ha (20,000 acres) of the BNWTF (Marr 2001). This resulted in decreased shrub cover in burned sites (Marr 2001). In 2008, roughly 12,500 acres of the BCA and two-thirds of the BNWSTF burned. The majority of the BCA burn was not severe, but many areas on the BNWSTF were burned severely, including much of the sagebrush habitat. The Nature Conservancy is working on a post-fire plan for restoration seeding and weed control in the burned area on the BCA. The impact of the 2008, fires on squirrels is uncertain. The Nature Conservancy monitored

squirrel sites on the BCA in 2009. The results of that monitoring indicate that there has been a substantial decline since 2005 (Marr et al. 2009). Marr et al. 2009 suggest that the decline is due to persistent winter weather that has occurred over those five years resulting in poor winter survival and low reproductive success.

B. Overutilization for commercial, recreational, scientific, or educational purposes:

Washington ground squirrels are often viewed as pests (Bailey 1936, Howell 1938, Rickart and Yensen 1991, Rulofson 1993, Askham 1994, Wisdom et al. 2000) and are subject to recreational shooting and poisoning to reduce impacts to agricultural crops (Betts 1990, 1999; Rickart and Yensen 1991, Hafner et al. 1998, ODFW 1999, Sherman 2000). Sport shooting and poisoning can decimate small and isolated populations of the target species (Yensen and Sherman 2003). From 1948 to 1970, the decline of Washington ground squirrels was attributed to poisoning and/or shooting, as well as significant habitat loss (ODFW 1999). Sherman (2000) documented the deaths of 2 individual squirrels due to shooting; these 2 squirrels represented 22 percent of the marked individuals in the colony under study and were the only observed Washington ground squirrel mortalities during the 2000 field season. In 2005, the CWCS noted that illegal target shooting continues despite legal protection (WDFW 2005). This may also be the case for publicly-accessible and/or private lands in Oregon.

Previous Washington ground squirrel studies have involved purposeful mortality of squirrels for scientific collection and to study diet, reproduction, and other characteristics. More recently, there is likely some incidental mortality and/or harassment from live-trapping, radio-collaring, monitoring, and behavioral studies. However, this mortality appears to be minimal, and scientists employ a variety of measures to decrease the amount of mortality due to research.

C. Disease or predation:

Small colonies are vulnerable to extirpation from natural causes such as predators and epizootics (Betts 1990).

One of the most potentially devastating diseases to Washington ground squirrels is sylvatic plague, which can invade rapidly, have large impacts, and lead to the extirpation of local populations (Biggins and Kosoy 2001). While ectoparasites (e.g., fleas, mites) are frequently observed on Washington ground squirrels, they rarely appear to be a problem (Carlson et al. 1980, Sherman 1999, 2000, Sherman and Shellman Sherman 2005). Plague has been documented within the Washington ground squirrel's range (Svihla 1939). Although there was no direct evidence of plague–caused mortality, Svhila (1939) reasoned that it caused colony extirpations in the region where the disease was documented. Additionally, a colony of Townsend's ground squirrels, a closely related species, was seriously reduced by an outbreak of sylvatic plague in Washington in 1936 (Betts 1990).

Predation can be a major source of mortality (Carlson et al. 1980, Betts 1990,1999; Greene 1999, Sherman 1999, 2000). Known predators include the badger (Taxidea taxus), birds of prey, the long–tailed weasel (Mustela frenata), gopher snake (Pituophis melanoleucus), and the western rattlesnake (Crotalus viridis) (Carson et al. 1980, Greene 1999, Verts and Carraway 1998, Sherman 1999, 2000; Klein 2002, 2003; Sherman and Shellman Sherman 2005). Badgers and raptors commonly prey on Washington ground squirrels and are a particular threat to small, isolated colonies because they may cause local extirpations (Betts 1999, Morgan and Nugent 1999). The coyote (Canis latrans), raven (Corvus sp.) and burrowing owl are also potential predators on the Washington ground squirrel (Carlson et al. 1980).

D. The inadequacy of existing regulatory mechanisms:

Several factors related to the inadequacy of existing regulatory mechanisms affect the Washington ground

squirrel in Oregon and Washington. In Washington, the species is listed as a State candidate species with no legal protection. A species is considered a candidate if sufficient evidence suggests that its status may meet the listing criteria defined for State Endangered, Threatened, or Sensitive species (WDFW 1998). The State of Washington is currently completing a status review of the Washington ground squirrel. Although Washington ground squirrels receive no legal protection from the state as a candidate, they are listed as "other protected wildlife" under the State of Washington Administrative Code (WAC) 232-12-011. This prohibits hunting, malicious killing, and possession of protected wildlife species. The protections given to "other protected wildlife" apply to all lands, including private land.

In Oregon, as noted above, the Washington ground squirrel is listed as a State endangered species under the Oregon Endangered Species Act (OESA) due to loss of habitat, fragmentation and isolation of colonies and suitable habitat, proposed development of much of the species range within Oregon, and inadequate Federal and State regulations to protect the species (OAR 635-044-0130). The OESA provides protection from "take" (to kill or obtain possession or control of any wildlife, as defined by ORS 496.004) on State-owned, leased, or managed lands. Under the State of Oregon's survival guidelines (OAR 635-100-0136), activities detrimental to the survival of Washington ground squirrels are not to be permitted in areas of occupied habitat on State-owned, managed or leased lands. The OESA requires that survival guidelines be adopted at the time of listing (ORS 496.182; OAR 635-100-0130, 635-100-0136). Survival guidelines are "quantifiable and measurable guidelines that [the State Fish and Wildlife Commission] considers necessary to ensure the survival of individual members of the species" (ORS 496.182(2)). These survival guidelines "apply only to actions proposed on lands owned or leased by a State agency, or where a State agency holds an easement" (OAR 635-100-0136). The OESA does not provide any protection of the Washington ground squirrel on private property (ORS 496.192).

The State of Oregon previously owned one of the two largest contiguous blocks of land with Washington ground squirrels in the range of the species. Oregon leased the 38,708 ha (95,650 acres) property to Boeing, Inc. in the early 1960s with the stipulation that the land be developed. Boeing's development plans failed to materialize. To meet the requirements of their lease, Boeing subleased the property to several large agricultural corporations and individuals. The largest block of land was subleased to Inland Land. Boeing transferred the lease of the site to the Offutt Company which, along with Threemile Canyon Farms, later purchased the property, expressing a desire to work toward an equitable management of Washington ground squirrel habitat and agricultural development.

The survival guidelines allowed continuation of planned agricultural development by exempting Inland Land from the guidelines between January 21, 2000, and February 18, 2000, providing enough time to complete planned development in 2000. The exemption was established with the provision that all "activities detrimental to the survival of Washington ground squirrels" were conducted in a manner that avoided take (i.e., killing or possessing) of Washington ground squirrels (OAR 635-100-0136).

Approximately 35 percent of the Boeing property's 38,708 ha (95,650 acres) have been modified for irrigated agriculture (ODFW 1999). The majority of known Boeing tract squirrel sites are located on a 9,146 ha (22,600 acre) permanent ODFW Conservation Easement (BCA) and are protected under the OESA. For any other State-owned or leased land or easements elsewhere within Oregon where suitable Washington ground squirrel habitat and soil types occur, the involved State agency is required to consult with ODFW before authorizing activities detrimental to Washington ground squirrels.

Another factor affecting the State's ability to protect this species is conflicting regulations regarding nongame species and State-listed species. The take prohibition under the OESA only applies to State-owned, leased and managed lands, and is narrowly defined as "kill or obtain or control" of the species (ORS 496.004(15)). The Washington ground squirrel is also identified by the State as a protected nongame species (OAR 635-044-0130). This designation protects the species from hunting, shooting, killing, or possession on

all lands within the State. However, ORS 610.105 provides an exception, allowing landowners to kill any rodent by poisoning, trapping, or other means. Because the Washington ground squirrel is a rodent, it may be vulnerable to poisoning, trapping, or other control under this statute.

Relevant Federal laws that could provide protection to the Washington ground squirrel include the Endangered Species Act (Act), Clean Water Act, Fish and Wildlife Coordination Act, NEPA, and the Federal Land Management and Policy Act. However, these Federal laws as well as their implementing regulations and policies provide no protection to candidate species. Although we recommend that Federal agencies confer with us on the effects of their actions on candidate species, there is no legal requirement to do so for candidate species.

E. Other natural or manmade factors affecting its continued existence:

As discussed above, many sources have documented or cited other sources that have documented dramatic loss and modification of Washington ground squirrel habitat throughout the Columbia Basin. This remnant habitat is more susceptible to the surrounding landscape and external influences (Vander Haegen et al. 2001). Isolation and fragmentation of habitat further threatens the Washington ground squirrel by increasing its vulnerability to a variety of natural and manmade factors (Quinn 2004). Isolation and fragmentation can severely affect Washington ground squirrels by: limiting genetic exchange and reproduction; decreasing genetic diversity; causing genetic drift; exposing small colonies to destruction from unpredictable catastrophic events such as fire, disease, or drought; intensifying the threat of predation; and limiting habitat available for escape if occupied habitat becomes unsuitable (Betts 1990, ODFW 1999, Wisdom et al. 2000). Although isolation may hinder the spread of disease, it limits immigration from adjacent squirrel sites, which reduces the likelihood that colonies would be repopulated if they became extirpated (Betts 1990).

Isolation of sites due to habitat destruction, modification, and curtailment may result in inbreeding and genetic drift (Holekamp 1984, Gavin et al.1999). Floyd and May (2002) completed a population genetics study of Washington ground squirrels on the Seep Lakes Unit of the Columbia Basin Wildlife Area and CNWR. They examined the population structure of eight populations and identified strong genetic differentiation among sites. Approximately 11 percent of the overall genetic variation occurred between populations (versus 89 percent within). Floyd and May (2002) found 10 unique alleles, 6 originating from one study site. Seven populations were significantly differentiated at five microsatellite loci and unique alleles were present in four populations. They suggested that substantial genetic drift has occurred due to isolation of these populations.

Sherman and Shellman Sherman (2006) documented reproductive failure due to stochastic sex ratio skews in a small population of the Washington ground squirrel at the Squirrel Coulee. This is an “often proposed but seldom documented cause of population decline and extinction” (Sherman and Shellman Sherman 2006). Another threat related to the isolation of populations is their increased susceptibility to problems associated with inbreeding (Greene 1999).

Natural fluctuations of weather and the potential for drought may threaten the Washington ground squirrel more so today than in the past due to habitat fragmentation caused by the reduction of the squirrel’s range and available habitat remaining in its current range.. The short-term effects of adverse weather are now more likely to be significant when considered with other cumulative human-induced threats (ODFW 1999). Similar to other rodents (Smith and Johnson 1985, Quade 1994, ODFW 1999), Washington ground squirrel populations appear to fluctuate locally. This is partly due to changes in climate conditions. A series of drought years reduced the occurrence of Washington ground squirrels in 1994 (Quade 1994). In contrast, above average rainfall preceded a relatively higher abundance of the species (Greene 1999, Klein 2003).

Winter and spring droughts limit vegetation quality and quantity. Limited forage in the spring and early summer is likely to adversely affect juvenile survival to independence and survival through estivation/hibernation (Carlson et al. 1980, Murie 1984, Greene 1999, ODFW 1999). Ground squirrels

depend on high quality forage and an abundant supply of seeds to store fat needed to survive estivation/hibernation (ODFW 1999, Vander Haegen et al. 2001) and the availability of forage for diet is critical since they commonly lose half their body weight during estivation and hibernation (Carlson et al. 1980). Adequate forage quality and quantity is also needed for successful reproduction. Given the importance of bluegrass in Washington ground squirrel diets, drought may cause additional concern (Tarifa and Yensen 2004a) as bluegrass desiccates and seeds mature early, leaving squirrels with fewer food resources at the end of the growing season. This has been linked to low body mass before estivation/hibernation and low overwinter survival in closely related species (Tarifa and Yensen 2004a, Van Horne et al. 1998a, 1998b).

Climate change could be another threat to the persistence of the Washington ground squirrel, but we are unable to determine its potential impact at this time. We are uncertain whether and how climate will change significantly from its normal patterns within the range of the squirrel (e.g., increased or decreased precipitation or temperature). We are also uncertain how these potential changes could impact squirrels. Decreased precipitation, particularly in the summer, is favorable for cheatgrass, while increased precipitation can reduce cheatgrass' distribution (Bradley 2009). We could infer that climate change resulting in additional precipitation could benefit squirrels if cheatgrass becomes less dominant on the landscape, by allowing more nutritional plants to thrive and by reducing the occurrence of fire. However, increased precipitation could also provide an environment that is favorable to other noxious weeds that could be as problematic for squirrels as cheatgrass. We are seeking additional information on the potential impacts of climate change because this issue warrants further investigation.

Competition is a possible threat to this species. Carlson et al. (1980) reported that habitats previously occupied by Washington ground squirrels have been taken over by Columbian and Belding's ground squirrels. Both of these squirrel species are larger and may out-compete Washington ground squirrels for available resources in a disturbed habitat, which may explain why there is little or no range overlap of these species. It is not clear whether they are able to or would further encroach upon Washington ground squirrel habitat in disturbed areas. Carlson et al. (1980) reported one case of range overlap between the Washington ground squirrel and the Belding's ground squirrel near Heppner, Oregon.

Betts (1990) predicted the extirpation vulnerability of known squirrel colonies based on their size, isolation, and land use. Subsequent surveys (Betts 1999) proved many of his predictions correct. As Betts (1999) states, while small isolated populations "may persist for some time, they are highly vulnerable to extinction from a variety of factors such as predation, parasitism (ectoparasites/fleas that could potentially transmit plague), and weather that may reduce the population below a sustainable level or eliminate it entirely."

Conservation Measures Planned or Implemented :

The Threemile Canyon Farms MSCCAA between Threemile Canyon Farms, The Nature Conservancy, PGE, ODFW, and the Service was signed in 2004. The Agreement includes commitments by these parties to implement a number of conservation measures intended to benefit the species covered by the Agreement: the Washington ground squirrel, ferruginous hawk (Buteo regalis), sage sparrow (Amphispiza belli), and the loggerhead shrike (Lanius ludovicianus gambeli). If a covered species becomes listed as threatened or endangered under the Act during the 25-year Agreement period, the permits allow each permittee to take such species within identified portions of the project area (Covered Area) provided that the take is incidental to implementation of Covered Activities (David Evans and Associates 2004). The Covered Area includes approximately 34,555 ha (95,000 acres) of property owned by Threemile Canyon Farms, PGE, and property leased by the Boeing Radar Range from Threemile Canyon Farms. Approximately 9,146 ha (22,600 acres) of the Covered Area was placed under a permanent ODFW conservation easement (BCA) and will be managed by The Nature Conservancy. Another 356 ha (880 acres) of property was designated by PGE as a Conservation Area.

The Service has been closely coordinating with the State of Oregon to assess the status of the Washington

ground squirrel. In 1997, the Service contracted with the ODFW to compile information necessary to complete this candidate assessment form. In January 1999, the State of Oregon was petitioned to emergency list the species as an endangered species under the OESA, and the species was listed as a State endangered species in January 2000. The Service has attended several meetings with the ODFW and the Oregon Fish and Wildlife Commission to obtain and analyze information and data regarding the status and potential threats to the species.

Cooperative Agreements, primarily with the Navy to conserve the species on the BNWSTF, are a potentially valuable tool to conserve the Washington ground squirrel. However, the current amount or quality of habitat that may eventually be protected on the BNWSTF is unknown. It is also uncertain whether the level of protection offered would be adequate to provide long-term survival of the species range-wide. To date, the Navy has been hesitant to consider a conservation agreement. Alternatively, the revised INRMP has incorporated some conservation actions for the species in the context of the Navy's mission that may be implemented if funding and other resources allow.

There are several recently finalized or ongoing research and monitoring efforts in Oregon and Washington to address Washington ground squirrel research needs:

• The Washington Wildlife Habitat Connectivity Working Group's habitat connectivity analysis for the Columbia Plateau Ecoregion was finalized.
• The WDFW is monitoring historic and new sites, and has developed public outreach materials on conservation of the Washington ground squirrel. The WDFW also started translocating squirrels in 2006 and continues to refine their techniques annually. They are monitoring the results of these efforts.
• Hanford National Monument biologists surveyed for Washington ground squirrel activity recently.
• The Nature Conservancy and ODFW have completed multiple-year squirrel surveys on the BCA and portions of the BNWTF.
• The BLM has completed squirrel surveys on portions of their Wenatchee Resource Area. Surveys were also completed recently near Moses Lake for the Bureau of Reclamation's Odessa Subaquifer project.
• In Oregon, Klein (2005) completed a two-year juvenile Washington ground squirrel dispersal study and Delavan (2008) finished a study of adult and yearling home range sizes and movements.
• In Washington, Tarifa and Yensen (2004a, 2004b) conducted a multiple-year diet study, Sherman and Shellman Sherman (2007) are researching Washington ground squirrel demography, and WDFW finished their report that summarizes how landscape composition affects site occupancy in Washington (Germaine et al. 2007).
• Washington ground squirrel population dynamics on the Seep Lakes Unit of the Columbia Wildlife Area are being studied, as well as a genetic analysis of Washington ground squirrels at selected sites in Washington and Oregon. Results from that research and monitoring will assist in the development and implementation of future conservation measures.
• Washington Department of Fish and Wildlife completed a four-year study (including a year pilot study) that looked at squirrel occupancy and detection rates at occupied sites, and measured site and sampling covariates that could potentially affect squirrel detection.
• The Service's Oregon Fish and Wildlife Office and Columbia National Wildlife Refuge also hosted a one-day Washington ground Squirrel workshop in Othello, Washington in March 2009. The purpose of the workshop was to provide a forum for natural resource managers to create a common understanding of Washington ground squirrel biology, habitat needs, and threats to the species. Participants discussed recently completed and in-progress research and conservation actions, and identified planned or proposed research and conservation actions. There was also a discussion of obstacles and potential solutions to implementing conservation actions, and a concerted effort to build momentum towards long-term conservation commitments.

Summary of Threats :

This species warrants listing throughout all of its range for the following reasons:

Two-thirds of its historic range has been converted to agriculture. Most historic habitat is permanently lost (or would require long-term restoration) due to crop circle irrigation development, tilling, and discing. Remaining habitat is fragmented in both Oregon and Washington. Isolation of existing colonies further threatens this species by increasing its vulnerability to a variety of natural and manmade factors including agriculture and energy development, military activities, intensive grazing, disease, predation, recreational shooting, recurrent fire, unknown but potential impacts of pesticides, spread of non-native species, drought, decreased genetic diversity, genetic drift, and potential competition with other ground squirrel species in disturbed areas at the periphery of the Washington ground squirrel's range. Furthermore, fragmentation limits the availability for escape if occupied habitat becomes unsuitable, reduces or eliminates dispersal and immigration events, and prevents re-colonization of extirpated sites.

While there has been an increase in the number of Washington ground squirrel detections recently, this increase is partly due to increased sampling effort, and sampling during possibly high peaks in a population cycle. Overall, there is a documented decrease in its historic range, as well as an overall decrease in habitat availability, which is even more significant for this species. Within local areas, colonies will fluctuate, acting as sources and sinks, but on a larger scale, squirrels require connected habitat patches of sufficient size to maintain population viability. Many of the new detections are at smaller sites located in fragmented clusters of habitat. On the other hand, some of the more recent detections are could be larger colonies due to the clustering and close distance between some of these detections. The long-term viability of these newly detected colonies is unknown, and their status will be further evaluated.

Although some conservation has been achieved for the Washington ground squirrel (e.g., the Threemile Canyon Farms Agreement and the OESA listing in Oregon), substantial threats of further habitat loss and fragmentation, especially on private lands, with concomitant adverse impacts on population and genetic viability are present throughout its range.

For species that are being removed from candidate status:

_____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

Recommended Conservation Measures :

Washington ground squirrels may benefit from the following conservation measures:

• Maintain remaining areas of suitable habitat and restore degraded habitat using a variety of tools appropriate for site-specific needs (e.g., thinning, mechanical treatment, burning or fire suppression, reseeding and plugging of native species).
• Maintain populations as individual units where possible to prevent loss of genetic variation.
• Create or maintain corridors between occupied sites to facilitate dispersal and genetic exchange among colonies (ODFW 2006). This may be achieved using widely spaced piles of wood or stones (Sherman and Shellman Sherman 2005).
• Re-establish normal fire cycles to encourage patchy (versus widespread) fire events. The appropriateness of this measure will depend on the site and methods used. Use of fire without subsequent seeding with natives may increase the amount of cheatgrass and other non-native species.
• Monitor habitat and populations in both states and survey areas of potential habitat for squirrel sites.
• Fund and carry out research in a variety of areas (e.g., monitoring effects of grazing, disease, herbicides, pesticides, noise, climate fluctuations, or translocation; studying demography, population dynamics, genetic variation, potential female dispersal, effectiveness of vegetation treatments, and potential for re-colonization of vacated sites).

• Use translocation either: (1) as a last resort from areas that will be developed;(2) to augment sites experiencing inbreeding depression; or (3) to reintroduce squirrels to suitable habitat. This alternative should be used with caution, and its effects should be closely monitored to determine whether it is successful.
• Post, replace, and augment signs and patrol state and Federal property to increase public awareness regarding the species' status and protection where appropriate.
• Encourage the reduction of shooting and poisoning, and enforce prohibition against shooting and poisoning where applicable.
• Increase public education about the species and threats.
• Encourage private landowners, organizations, and government land agencies to monitor and/or provide species protection.
• Explore methods to restore developed areas to native condition and monitor results.
• Combine monitoring or surveying where similar survey efforts are implemented (e.g., pygmy rabbit, sage grouse, or hawk surveys).
• Develop candidate conservation agreements for the Washington ground squirrel in both states to implement a variety of conservation measures on private and public lands.
• Since terminology of "colonies" and "detections" is not always consistent, conduct a range-wide GIS spatial analysis of all know detections and colonies to inform future range-wide comparisons.

Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	**5**
		Subspecies/Population	6
Moderate to Low	Imminent	Monotype genus	7
		Species	8
		Subspecies/Population	9
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

Rationale for Change in Listing Priority Number:

Magnitude:

When evaluating the magnitude of threats to a species the following factors are considered: 1) the extent of the species' population and/or range affected by threats and the biological significance of that portion; 2) the likelihood of the species' persistence in unaffected populations/portions of its range; and 3) the permanence of effects to the species.

Approximately two-thirds of the Washington ground squirrel's total historic range has been converted to agriculture, and the remaining one-third is degraded due to fragmentation of formerly contiguous blocks of habitat. This species is currently distributed in scattered populations in three Oregon and six Washington counties. Isolation of existing colonies further increases their risk of extirpation from a variety of natural and

manmade factors, such as agriculture and wind energy development, military activities, grazing, disease, predation, recreational shooting, recurrent fire, pesticides, spread of non-native species throughout its range, potential drought, decreased genetic diversity, genetic isolation, genetic drift, and competition with other ground squirrels along the periphery of its range. Fragmented habitats can isolate squirrels and eliminate escape routes if habitat becomes unsuitable, reduce or eliminate dispersal events, and prevent re-colonization of extirpated sites.

The magnitude (scope and severity) of threats to the Washington ground squirrel varies among populations and among threats. Although habitat loss, degradation, and fragmentation, and an increase of non-native species is occurring throughout the species' range, the severity of these threats varies by site. Inadequate regulatory mechanisms exist in Washington and on much of the private and Federal land in Oregon. The Threemile Canyon Farms Agreement protects only 36 percent of Oregon colonies or almost one-third of known, occupied habitat in Oregon, from agricultural development and recreational shooting, but not from disease and drought. There are very limited regulatory mechanisms to address threats to the Washington ground squirrel on land that is not state-owned, leased, or managed in Oregon, and on lands in the state of Washington. These limited regulatory measures are often subject to inadequate enforcement.

Squirrel detections have increased in recent years, probably due to increased survey effort and because this species has likely been at a peak of a population cycle. Many, but not all of these have been located in fragmented habitat patches. There remains an overall decrease in the extent of their historic range and in the remaining habitat available within their current range. Given the significant loss and degradation of habitat and the variety of ongoing and potential threats remaining within the range of the Washington ground squirrel, the overall magnitude of threats to this species remains high.

Imminence :

Immediacy of threats is based on when threats are projected to begin, not on how quickly a species is likely to become extinct if threats are not addressed. Threats to the Washington ground squirrel include both imminent and non-imminent threats. Imminent threats include: the persistence of invasive plant species (which alter natural fire regimes, available cover, and diet), potential genetic drift of isolated populations, and wind power development in Oregon (which occurs in shrub-steppe habitat, but effects can be minimized through compliance with the ODFW and/or the Columbia Basin Ecoregion wind energy siting and permitting guidelines).

Less imminent threats include the continued conversion of suitable habitat to agriculture (based on trends, there are no specific documented plans for additional conversion), current military activities (which do not currently appear to be entirely incompatible with the species), and the potential for disease, predation, and drought to impact small, isolated colonies. We also consider the proposed development of shooting ranges on the BNWSTF in Oregon as less imminent because the OMD and Navy have not described a preferred alternative or a final proposed action. The OMD and Navy are working with ODFW, the Service, and other partners to prevent or limit take of the Washington ground squirrel while they develop a final proposed action.

The imminence of threats has recently been reduced, in part, because of the Threemile Canyon Farms Agreement. The Agreement addressed the imminent loss of a large portion of Washington ground squirrel habitat to agriculture. Because there are no other large-scale efforts to convert suitable habitat to agriculture, wind power projects in Oregon comply with the OESA (where there is a state nexus), and because the BNWSTF is still in the scoping process and the agencies are working to comply with OESA and minimize impacts to the species, we consider the overall threats to the species to be non-imminent.

__Yes__ Have you promptly reviewed all of the information received regarding the species for the purpose

of determination whether emergency listing is needed?

Emergency Listing Review

__No__ Is Emergency Listing Warranted?

Threats to the Washington ground squirrel on a range-wide scale are high in magnitude but low in imminence; there are no known activities reasonably expected to occur in the near future that would put the entire population of the species at risk of extinction. Recent surveys by WDFW, BLM, and The Nature Conservancy have documented additional occupied sites in Oregon and Washington. Furthermore, a conservation agreement was signed in 2004 that protects roughly 36 percent of known Oregon colonies (or one-third of its known occupied range in Oregon) from development and recreational shooting. The effectiveness of this Agreement will be monitored closely, and efforts to increase conservation measures throughout the region will be pursued. While there is a proposal to develop shooting ranges on a large and significant area of occupied habitat, we do not have a final proposed action for which we can analyze the scope and severity of this threat.

Description of Monitoring:

A variety of measures are being used in Oregon and Washington to monitor the status of the Washington ground squirrel. The ODFW completed a five-year monitoring effort of the colonies on the BNWSTF in 2003. Marr (2003) revisited historic and currently occupied sites and provided some estimates for the percent of site extirpations per year on the BNWSTF. Marr also surveyed part of the north portion of the BNWSTF in 2005 and the Oregon Military Department surveyed areas in 2006, locating additional occupied sites. The entire site has not been surveyed according to the protocol established by Morgan and Nugent (1999), but 149 colonies were currently occupied as of 2003. Marr (2003) also estimated the relative size of colonies. In the future, it would be useful to complete a survey of the entire BNWSTF site if this becomes an option. In addition to ODFW monitoring, Klein (2002, 2003, 2005) investigated the fates and dispersal movements of juvenile male Washington ground squirrels. Additionally, the OFWO funded a two-year study addressing adult movement and the home range size of Washington ground squirrels on the BCA and BNWSTF (Delavan 2008). This information aids our understanding of the species' spatial requirements.

The Nature Conservancy revisited all known occupied sites on the BCA in 2004 to determine the percent of site extirpations since 1999 and 2001. They also estimated the relative size of existing colonies including small (0 to 2,500 square m (26,610 square feet)), medium (2,500 to 10,000 square m (26,610 to 107,639 square feet)), and large (greater than 10,000 square m (107,639 square feet)). As part of their Agreement responsibilities, The Nature Conservancy will sample available Washington ground squirrel habitat on the BCA according to the protocol established by Morgan and Nugent (1999) every two to five years to track the spatial distribution of colonies and the creation of new colonies over time. Additionally, they will sample known colonies every one to three years to document changes in their extent and activity over time (David Evans and Associates 2004). The Nature Conservancy continues to monitor sites on the BCA, consistent with the terms of the Agreement.

There are also a variety of monitoring efforts in effect for the Washington ground squirrel populations in the State of Washington. The BLM completed a survey in 2002 of a large portion of its Wenatchee Resource Area in Douglas and Grant Counties, and have since completed additional surveys on BLM lands. They recorded 83 detections of Washington ground squirrels using a protocol similar to Morgan and Nugent (1999). The WDFW is monitoring historic and currently occupied sites (including those visited by Betts) on private and government property. The WDFW also completed a study that examined how landscape composition affects site occupancy in Washington (Germaine et al. 2007).

There are also ongoing research studies on Washington populations. One study is addressing Washington ground squirrel demography and behavior (Sherman 1999, 2000, 2001; Sherman and Shellman Sherman

2005, 2006, 2007). Another is addressing the population dynamics of squirrels on the Seep Lakes Unit of the Columbia Wildlife Area, as well as a genetic analysis of selected sites in Washington (Hill 2005, pers. com.). This study will also compare this information with the genetic makeup of selected squirrels in Oregon. The WDFW began a translocation study in 2011 to determine the feasibility of and process for moving Washington ground squirrels under different management scenarios with funding from the Service's Oregon Fish and Wildlife Office. The WDFW will continue research related to their recently completed occupancy and detection rate study.

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

Oregon,Washington

Indicate which State(s) did not provide any information or comment:

none

State Coordination:

The species is included in a State Wildlife Action Plan as a species of conservation concern as follows: Oregon ("strategy species" for the Columbia Plateau Eco-region) and Washington ("species of greatest conservation need" for the Columbia Plateau Eco-region).

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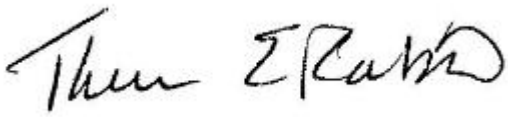
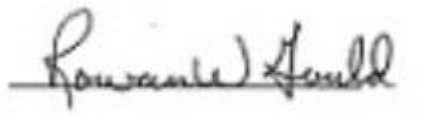
Approval/Concurrence:

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  05/25/2012
Date

Concur:  11/06/2012
Date

Did not concur: _____ _____
Date

Director's Remarks: